



## ICAO ENGINE nvPM EMISSIONS DATA SHEET

### SUBSONIC ENGINES

ENGINE IDENTIFICATION:	BR700-710A2-20	BYPASS RATIO (-):	4.2
UNIQUE ID NUMBER:	01P04BR013	PRESSURE RATIO $\pi_{co}$ (-):	24.2
COMBUSTOR:			
ENGINE TYPE:	MTF	RATED OUTPUT $F_{oo}$ (kN):	65.6

#### REGULATORY DATA

CHARACTERISTIC VALUES:	LTO <sub>mass</sub> /F <sub>oo</sub> (mg/kN)	LTO <sub>num</sub> /F <sub>oo</sub> (particles/kN)	NVPM MASS CONCENTRATION ( $\mu\text{g}/\text{m}^3$ )
LTO/F <sub>oo</sub> AND MAX nvPM <sub>mass</sub>	1362.7	1.71E+16	3345
AS % OF CAEP/10 LIMIT	-	-	40.1
AS % OF CAEP/11 LIMIT (InP)	42.1	88.5	
AS % OF CAEP/11 LIMIT (NT)	170.9	178.1	

#### MEASURED DATA

MODE	POWER SETTING (%F <sub>oo</sub> )	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM <sub>mass</sub> ( $\mu\text{g}/\text{m}^3$ )
				EI <sub>mass</sub> (mg/kg)	EI <sub>num</sub> (particles/kg)	
TAKE-OFF	100	0.7	0.723	608.5	3.97E+15	
CLIMB OUT	85	2.2	0.598	556.9	5.72E+15	
APPROACH	30	4.0	0.216	5.6	9.49E+14	
IDLE	7	26.0	0.091	11.2	1.30E+15	
LTO TOTAL (kg, mg, number of particles)			304	64319	8.07E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/F <sub>oo</sub> VALUES (mg/kN, particles/kN)				980.3	1.23E+16	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ( $\mu\text{g}/\text{m}^3$ )				608.9	6.77E+15	2599

\* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

#### DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (%F <sub>oo</sub> )	CORRECTED EMISSIONS INDICES	
		EI <sub>mass_SL</sub> (mg/kg)	EI <sub>num_SL</sub> (particles/kg)
TAKE-OFF	100	668.0	6.33E+15
CLIMB OUT	85	627.7	9.86E+15
APPROACH	30	7.8	2.55E+15
IDLE	7	15.5	3.45E+15

#### AMBIENT CONDITIONS

	From		To		FUEL	
BAROMETER (kPa)	100.3	100.6	100.3	100.6	HEAT OF COMBUSTION (MJ/kg)	43.33
TEMPERATURE (K)	287.6	291.7	287.6	291.7	HYDROGEN CONTENT (%mass)	13.95
HUMIDITY (kg water/kg dry air)	0.0074	0.0080	0.0074	0.0080	AROMATICS CONTENT (%vol)	15.4
					NAPHTHALENE CONTENT (%vol)	0.16
					SULPHUR CONTENT (ppm by mass)	45

MANUFACTURER:	Rolls-Royce Deutschland
TEST ORGANIZATION:	Rolls-Royce Deutschland
TEST LOCATION:	Dahlewitz
TEST DATES:	11/10/2019-12/10/2019

#### REMARKS

1. Certification Report EDNS01000832272 Issue 2
2. The maximum EI<sub>num</sub> occurs between 30% and 85% F<sub>oo</sub>
3. Corrected peak EI number value (fuel correction) since EEDB v30